Annual Update

Kentucky Experimental Program to Stimulate Competitive Research (EPSCoR)

Submitted to:

Kentucky Council on Postsecondary Education

Submitted for:

The Kentucky Statewide EPSCoR Committee

Submitted by:

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KENTUCKY EXPERIMENTAL PROGRAM TO STIMULATE COMPETITIVE RESEARCH (EPSCoR)

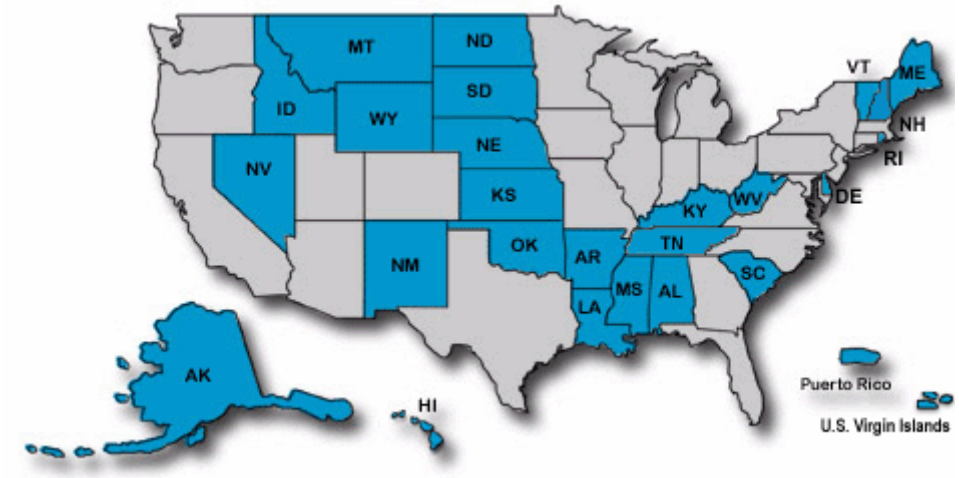
Program Description and Priorities

The Kentucky Statewide EPSCoR (KY EPSCoR) Program's mission is to enhance the research and intellectual capacity of universities and colleges by building and coordinating strategic investments in human capital and physical infrastructures necessary for Kentucky to excel in federal R&D funding competitiveness. The Statewide Program is divided into two programmatic areas: the ***Federal Agency EPSCoR Program*** which with some exceptions requires state matching funds, and the ***KY EPSCoR Infrastructure Seeding Program*** which generally requires institutional matching funds and a commitment to submit a proposal for federal R&D funding. The Federal Agency Program receives the majority of KY EPSCoR's budget and is the primary program through which KY EPSCoR receives research funding support. A discussion of each of the two programmatic areas follows:

Federal Agency Program

There are seven federal agencies participating in federal EPSCoR-type programs. The federal EPSCoR program has become popular and federal funding for the program has grown from $147 million in FY 2000 to $365.5 million for FY 2007. There are now 25 states eligible to participate plus the Virgin Islands and Puerto Rico. (See Figure 1.)

Figure 1. EPSCoR States/Territories



Source: NSF EPSCoR

The National Science Foundation pioneered the EPSCoR concept, and it is the second largest funding contributor to the national program. The National Institutes of Health's EPSCoR-type program, called an Institutional Development Award (IDeA), has now become the largest funding contributor.

Each federal agency program has similar objectives but differ in program structure and proposal award process. Table 1 provides insight into the different agency EPSCoR programs. Each agency has different reporting requirements and fiscal years which complicate fiscal tracking. As noted, the matching requirement for federal funds varies per agency program. A match requirement of 2 to 1 means that for every $2 federal dollars received, KY EPSCoR must match with $1 state dollar.

Table 1
Funding Guidelines

Federal Agency or State Program	Grant Fiscal Year	Period of Performance	Match Requirement
NSF	6/1 – 5/31	6/05 – 5/08	2 to 1
NASA	8/1 – 7/31	8/01 – 7/06	1 to 1
DOE	TBD	TBD	1 to 1
EPA	Varies	Varies	1 to 1
NIH	Varies	Varies	None
DoD	Varies	Varies	2 to 1
USDA	Varies	Varies	None
Infrastructure Support (State)	7/1 – 6/30	Varies	Varies

Based upon a recent National Science Foundation policy directive for all NSF program awards, the NSF will not stipulate that EPSCoR states provide a 2 to 1 cash match in new proposal submissions. However, NSF will look for evidence that EPSCoR states are financially committed. Per current EPSCoR RII solicitation guidance, NSF stipulates:

> "Although no cost sharing funds are required for these proposals, clear evidence of the jurisdiction's commitment must be included with the proposal. The level of commitment will differ among applicants because of the variability of resources available among jurisdictions. At a minimum, a letter of support from a senior official should outline the commitment of resources and facilities to sustain and support the project throughout the period of funding, and to maintain these resources beyond the period of support. "

This policy will become effective for KY EPSCoR during our next award cycle which will occur in 2008. NSF EPSCoR has traditionally been a state/federal partnership. While outside agency pressures beyond the control of the NSF EPSCoR office have contributed to a formal removal of the cost match requirement, the program clearly expects continued support to be included within submitted proposals. Based upon phone interviews, many states are electing to continue their cost-match funding regardless of the recent change in solicitation language.

No state matching dollars are currently required by the NIH program. The Kentucky Statewide EPSCoR Program interacts with federal legislators, with the assistance of the EPSCOR Coalition, to continue the expansion of the increasingly important NIH program from which Kentucky is receiving significant funding.

Subcommittees have been established by KY EPSCoR for four of the federal agency programs. These Subcommittees, as identified in Figure 2, managed the proposal process for their respective agency program for the reporting period.

FIGURE 2
Federal Agency Subcommittees and Chairs

NSF	John Connolly, University of Kentucky
DOD	George Pack, University of Louisville
NASA	Richard Hackney and Karen Hackney, Western Kentucky University*
DOE	John Stencel and Eric Grulke, University of Kentucky **

* Richard Hackney passed away on 3-21-07. Karen Hackney became the new chair.
** John Stencel rotated off and Eric Grulke became the new chair on 10-9-06.

The Statewide Committee supervises and directs the activities of Kentucky's federal agency subcommittees. Policy of the Statewide Committees is for each agency subcommittee to have two Statewide Committee representatives.

The federal agency and infrastructure programs collectively had 205 active projects for FY07 and provided new funding for 67 of those projects during the fiscal year period. These projects included funding support for academic researchers pursuing specific research topics, as well as funding for scientific instruments and equipment, and other infrastructure building activities. Currently four of the federal agencies (NSF, NIH, DOE, and NASA) have infrastructure building components within their program. See the Portfolio of Projects and Investments in the Attachments for a listing and more detail on the projects funded.

KY EPSCoR Infrastructure Seeding Program

Consistent with its mission, KY EPSCoR has seeding initiatives to build human capital, increase the state's science and technology infrastructure, improve cooperation among researchers in the state, and promote multi-institutional cooperation in key areas. These initiatives are varied but include activities to stimulate major research initiatives, identify emerging research arenas promising accelerated funding growth, and build research infrastructure at the comprehensive universities. The KY EPSCoR Infrastructure Seeding Program provided funding for 12 projects during the reporting period. The number of projects per infrastructure seeding initiative is listed below:

Program	FY 06 Awards
Research Start-up Funds (RSF)	Two Awards
National Laboratory Initiative (NLI)	Six Awards
Collaborative Research Initiation Grants (CRIG)	Two Awards
Collaborative Research Development Grants (CRDG)	One Award
EPSCoR Conference Planning Grant	One Award

KY EPSCoR does not necessarily fund all infrastructure seeding programs each year. The Statewide Committee attempts to identify those seeding programs that will provide the greatest benefit for the budget period funding available. A description of each of the infrastructure seeding programs follows:

1. The Research Start-Up Fund (RSF) assists Comprehensive Universities in Kentucky by providing competitive research start-up packages for new faculty hires. These packages establish support levels commensurate with those offered by academic institutions in non-EPSCoR states and assist recruiting the strongest faculty. An institutional cash match of fifty percent is required. It further requires recruitment to be in areas consistent with EPSCoR and institutional interests, and gives proposers priority weighting if they are aligned with the Commonwealth's economic development focus areas.

2. Collaborative Research Development Program (Phase I = CRIG; Phase 2 = CRDG). The Collaborative Research Development Program initiative is intended to foster the development of large-scale multi-investigator research programs, centers, or institutes within the Commonwealth that will become competitive for federal Research & Development funding through agency, interagency, and multi-agency programs (NSF, EPA, DOE, DOD, NIH, USDA, NASA, etc.).

Collaborative Research Initiation Grants (**CRIG**s) provide support to enable groups of researchers to assemble and to explore the creation of a large-scale research initiative. Funds can be used for workshops, electronic meetings, seminar speakers, travel or other reasonable expenses associated with bringing Kentucky researchers and nationally known experts together to discuss emerging areas of national importance, common interests, and possible research initiatives. Respondents should view this RFP as an opportunity to establish a prominent presence in an emerging research area before the field becomes highly populated. Phase 1 **CRIG**s are up to one year in duration and may not exceed $10,000.

Groups that have evolved to the point where they have identified a research direction are eligible for a Phase 2 Collaborative Research Development Grant (**CRDG**). **CRDG**s are intended to support the organization and initiation of collaborative group activities, to establish the requisite advisory board or panel defined by the targeted funding institution, and to support the preparation and submission of a proposal to establish a major research program, center, or institute. CRDGs are up to one year in duration and may not exceed $30,000.

3. Research Enhancement Grants (REG) – are intended to encourage talented faculty to remain in the Kentucky education system and to strengthen undergraduate teaching and research. The **REG** program enables faculty from Kentucky's public and private undergraduate colleges and comprehensive universities to develop their research programs and to increase the participation of undergraduate students in research. While University of Kentucky and University of Louisville faculty are not eligible to receive REG awards, collaboration between Kentucky's undergraduate and research institutions is encouraged and consistent with EPSCoR goals and objectives. Funds are provided to assist in covering costs related to research, including recipient faculty's summer salary, undergraduate student support, fringe benefits, travel, materials and supplies, and equipment.

4. National Laboratory Initiative (NLI) supports initiatives to develop and nurture strong individual and institutional relationships with national laboratories, and to enhance the likelihood that Kentucky will acquire a national laboratory or a branch center of excellence. This program is also intended to support faculty researchers as they pursue opportunities to utilize highly sophisticated facilities and equipment not available in Kentucky for their research. Program funding can be used to acquaint faculty, graduate-level students and postdoctoral fellows with R&D opportunities at national laboratories, and conversely, to familiarize national laboratory personnel with the R&D capabilities of Kentucky universities, in general, and faculty, in specific.

5. The Conference Program provides the Statewide Committee funds to organize and conduct conferences which will promote the mission of KY EPSCoR. Conference activities focus upon emerging areas of high growth research opportunity and areas expected to benefit from increased federal funding. The annual KY EPSCoR Conference is funded through a Conference Program award.

6. The Pipeline Program (PIP) connects faculty and students at non-doctoral granting institutions with researchers at either the University of Kentucky or the University of Louisville. The faculty/student team commits to research at one of these institutions during two summers, and maintains contact throughout the year. Students matriculating to graduate school must apply to either the University of Kentucky or the University of Louisville. The faculty member must submit a research proposal for a federal grant jointly with the host faculty.

KY EPSCoR has traditionally viewed its main priority to be the capture of federal R&D funding for the Commonwealth's academic community. Corollary priorities are to increase the competitive posture of

junior researchers, and provide for additional research capacity through equipment purchases and other infrastructure building activities. KY EPSCoR has enlarged this view to encompass a pronounced interest and promotion of the new economy focus areas when such interest is amenable to the EPSCoR-type federal agency programs.

Program Oversight and Award Process

The Kentucky Statewide EPSCoR Committee supervises and directs KY EPSCoR. The Committee is composed of three group segments: senior university administrators responsible for research activities, senior research faculty from academic institutions, and public sector members who have senior level business and/or research backgrounds. Representation is sought from the Commonwealth's two main research universities plus the comprehensive universities. Figure 2 identifies the Committee membership for the reporting period.

FIGURE 3
Kentucky Statewide Committee Membership

Wimberly Royster, Chairman
Vice President for Research, Emeritus
University of Kentucky

Richard Alloo
General Manager, Production Engineering Plant
Toyota Motor Manufacturing, NA

Del Collins
Interim Director of the Division of Laboratory Animal Resources
University of Kentucky

Blaine Ferrell
Dean
Ogden College of Science and Engineering
Western Kentucky University

Eric Grulke
Associate Dean for Research and Graduate Studies
University of Kentucky

Thomas Hewitt
President, The Hewitt Group
Louisville, Kentucky

Rob Keynton
Professor and Chair, Department of Bioengineering
University of Louisville

T.S. Kochhar
Professor
Department of Biology
Kentucky State University

Ben Malphrus
Director, Space Science Center
Morehead State University

Manuel Martinez-Maldonado
Executive Vice President of Research
University of Louisville

John Mateja
Director, Undergraduate Research and Scholarly Activities Office,
Murray State University

Tom Otieno
Associate Dean for Administrative Affairs and Research
Eastern Kentucky University

Shivendra Sahi
Assistant Director, Applied Research and Technology Program
Western Kentucky University

Phil Schmidt
Director, Center for Integrative Natural Science & Mathematics
Northern Kentucky University

Steve Spalding
Director
Louisville Medical Center Development Corporation

Chuck Staben
Acting Vice President for Research
University of Kentucky

Bob Stout,
Professor and Chair, Deptment of Microbiology and Immunology
University of Louisville

Edwin Tivol
Vice President, Intelligence Operations and Homeland Security
Electronic Warfare Associates, Inc.

David White
Director, Hancock Biological Station
Murray State University

Mickey Wilhelm
Dean, J.B. Speed School of Engineering
University of Louisville

The award process for each of the Subcommittees is prescribed by its solicitation policy and procedures for proposal review and evaluation. A discussion of the award process for the following agencies follows:

KY NSF Subcommittee Award Process

SOLICITATION POLICY:

The KY NSF EPSCoR maintains a contact list to notify potentially interested parties of currently available funding opportunities. This list generally includes the following groups of people at all Kentucky colleges and universities:

- Presidents
- Research Office Personnel
- Department Heads (Deans) in science and technology related departments
- KY EPSCoR Committee members
- KY NSF EPSCoR Sub-committee members
- Individual Researchers in science and technology fields
- Individuals that have contacted us and requested that they be added to our mailing list.

In addition, the KY NSF EPSCoR maintains a publicly available website (www.kynsfepscor.org), which announces all of our funding opportunities

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals are submitted to KY NSF EPSCoR for each of our three programs: Infrastructure Awards (3−year awards); Research Enhancement Grants (REGs), which are "seed funding" awards that support regional faculty in Kentucky and also the acquisition of needed research instrumentation; and the Research Scholars Program (RSP), which supports underrepresented student populations in scientific research.

Infrastructure Awards: account for about 90% of the program's distributed funding. These large, focused projects seek to develop research infrastructure in specific science and technology areas at institutions across the state. Brief "idea papers" are submitted by faculty and are reviewed by an outside panel of experts (contracted through the American Association for Advancement of Science − AAAS). The field of "idea papers" is then narrowed to the most promising and full proposals are developed and mail reviewed by experts and also (again) by the AAAS panel. The final recommendations of the AAAS panel are forwarded to the KY NSF EPSCoR Subcommittee members. The Subcommittee ultimately decides which ideas will be included in a RII proposal submitted to NSF and makes it recommendation to the KY EPSCoR Statewide Committee..

The REG program: accounts for about 5%−7% of the program's distributions. REG awards are submitted by interested faculty in response to an annual solicitation and are then competitively awarded. A panel of experts from the two research universities in the state, the University of Kentucky (UK) and the University of Louisville (UL) is formed annually to evaluate these proposals and determine funding levels. Panel members are invited to review as part of this committee at the request of the KY NSF EPSCoR Director. Note that these awards are not offered to research university faculty. Only faculty members from regional Kentucky colleges or universities are eligible to receive this funding.

The RSP: is a relatively new program started in 2006 and implemented to replace and expand upon the success of Summer Program Awards from previous years. The RSP currently represents less than 1% of the total EPSCoR budget. These small awards (about 11 have been made to date) target supporting underrepresented students in scientific research projects. The students and a mentor faculty submit a jointly developed research plan of student activities. The proposals are accepted year round and the funding is awarded on a first come, first serve basis provided the students meet all program requirements. The KY NSF EPSCoR Director and Assistant Director review the RSP proposals.

KY DOE Subcommittee Award Process

SOLICITATION POLICY:

The DOE EPSCoR Subcommittee administers the Kentucky DOE EPSCoR Program for the Statewide EPSCoR Committee. It responds to DOE requests for proposals, each of which requires adherence to specific DOE-defined guidelines and protocols. For assembling a Program that is responsive to a DOE EPSCoR solicitation, the Subcommittee, in cooperation with universities and industry, assesses energy-related R&D strengths and needs within Kentucky. The Subcommittee then requests pre-proposals from universities throughout Kentucky which are reviewed strategically with respect to innovation and their potential impact on R&D competitiveness. Fully developed proposals are requested and, upon university-approved submittal, peer reviewed. These proposals are assembled into a comprehensive program that is submitted to the DOE for funding.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals submitted to the DOE EPSCoR Subcommittee are evaluated in an extramural mail peer review. Proposals are submitted to at least five 'experts-in-the-field', identified by their publication and research records. The Subcommittee also requests names of reviewers from the proposal respondents, specifically stating that no person who has potential affiliation or participation in the project should provide a review of a proposal nor should anyone who could financially gain by reviewing the proposal provide a review. After receiving at least three scientific reviews, the technical aspects of the proposals are ranked according to the reviewers' comments. They are also assessed relative to the extent to which they: add value to existing or new and innovative energy research in Kentucky; stimulate systemic change and advancement; and produce demonstrated achievements during the course and beyond the term of the award.

KY NASA Subcommittee Award Process

SOLICITATION POLICY:

Solicitation is made statewide via announcements transmitted electronically to research/academic affairs offices at all Kentucky universities and colleges for distribution to all eligible faculty on the campuses. The e-mail distribution is based on the directory maintained and provided by the Kentucky Council on Postsecondary Education. The announcement provides instructions for accessing the website that contains the full request for proposals and the forms needed for submission of proposals. Access for all eligible participants is facilitated by downloadable proposal instructions and forms.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

Proposals are reviewed and evaluated both by an independent External Review and Advisory Panel and by the members of the NASA EPSCoR Subcommittee. At a joint meeting of the Subcommittee and Panel, the advice of the Panel is provided for consideration by the Subcommittee. The Subcommittee decides on the awards, based on their own reviews, and full discussion of the Advisory Panel reviews with the Advisory Panel members and makes it recommendation to the KY EPSCoR Statewide Committee..

KY EPA Subcommittee Award Process

SOLICITATION POLICY:

US EPA has changed the way it administers its EPSCoR program. It no longer has a separate solicitation for EPSCoR awards, but stipulates that a percentage of its general research award programs go to EPSCoR states. Accordingly, the KY EPA EPSCoR subcommittee is no longer needed and has been disbanded.

KY DoD (DEPSCoR) Subcommittee Award Process

SOLICITATION POLICY:

In anticipation of the BAA (Broad Agency Announcement) from DoD, the subcommittee solicits white papers and letters of intent from researchers at various colleges and universities in the Commonwealth. Communications with the research deans and announcements to the research administrators, as well as the KY EPSCoR web page, are utilized extensively to notify potential applicants. The subcommittee evaluates the white papers and letters of intent received and encourages the investigators to share their research ideas with government researchers and program managers at DoD laboratories. When the BAA is issued, the subcommittee notifies the investigators as well as research offices at the colleges and universities and requests that proposals be submitted to the subcommittee prior to the federal DEPSCoR deadline.

POLICIES AND PROCEDURES FOR PROPOSAL REVIEW AND EVALUATION:

The proposals are sent for review to the subcommittee and also to an external group of three panelists. External reviewers are selected who have DoD experience either in an academic environment or in a federal research laboratory that is involved in DoD-related research. This external group then convenes at a central location to discuss, evaluate and rate the proposals. The following day the Kentucky DEPSCoR Subcommittee meets with the Eternal Panel to receive its rankings. The subcommittee then meets in closed session to determine which proposals will be forwarded to DoD. The DEPSCoR Subcommittee may accept the External Panel rankings or revise them in light of the state DoD research goals.

Finally, the Chairman of the DEPSCoR Subcommittee is required to write an executive summary of the proposed projects that explains the relevance of the individual proposals to the DoD mission, as well as to the research infrastructure of the universities. The complete proposal package and summary statement is then forwarded to DoD for review.

Performance Measure

Federal Funding Awarded

The primary goal of Kentucky EPSCoR is to secure federal research dollars and the required matching funds for the Commonwealth's academic institutions. Accordingly, the prime performance measure is the total aggregated federal and other funding received from competitive awards. Figure 4 provides the aggregated funding by source for the reporting period.

The KY EPSCoR program was responsible for securing approximately $29.2 million in R&D funding for the Commonwealth's academic research community for FY 2007. While still favorably high, this represents a $3.5 million decrease from FY 2006. The primary losses occurred within the federal funding budgets for KY EPSCoR's NASA and USDA programs, as well as a decrease in the NSF Co-funding or matching amounts. These losses were partially offset by a $ .7 Million increase in the federal funding for KY's NIH IDeA program. Although the DOE program posts a null amount for its federal funding below, they have secured a $1.9 Million award that will have a three year term and be reflected in next year's annual report. In contrast, the DoD program shows a $.4 Million federal budget amount for this year, however, the program remains in jeopardy of being phased out of future DoD budgets.

Figure 4. KY EPSCoR Program Funding by Source for FY 2007

Federal Agency Program:

Program	KY EPSCoR (Actual)	Federal (Budget)	Institutional (Budget)	Other (Budget)	Total
DOD	$0	$411,362	$175,994	$36,600	$623,956
DOE	$250,000	$0	$0	$0	$250,000
EPA	$0	$0	$0	$0	$0
NASA	$220,742	$597,733	$1,055,158	$0	$1,873,633
NIH	$0	$15,185,546	$418,000	$0	$15,603,546
NSF	$1,567,472	$3,000,000	$1,259,857	$0	$5,827,329
NSF-Match **	$0	$3,804,459	$0	$0	$3,804,459
USDA	$0	$1,026,091	$0	$0	$1,026,091
Sub-total:	$2,038,214	$24,025,191	$2,909,009	$36,600	$29,009,014

KY EPSCoR Infrastructure Seeding Program:

Program	KY EPSCoR (Actual)	Federal (Budget)	Institutional (Budget)	Other (Budget)	Total
CRIG	$20,000	*	$0	$0	$20,000
CRDG	$30,000	*	$0	$0	$30,000
RSF	$86,000	*	$43,000	$0	$129,000
NLI	$12,226	$0	$0	$0	$12,226
Conference	$24,585	$0	$0	$0	$24,585
Sub-total:	$172,811	$0	$43,000	$0	$215,811

KY EPSCoR Administration:

Program	KY EPSCoR (Actual)	Federal (Budget)	Institutional (Budget)	Other (Budget)	Total
KY EPSCoR Admin.	$228,875	$0	$0	$0	$228,875
Sub-total:	$228,875	$0	$0	$0	$228,875

KY EPSCoR Program

FY Total:	$2,439,900	$24,025,191	$2,952,009	$36,600	$29,453,700

* Recipients are required to submit proposals for Federal funding.

** This co-funding amount covers the period from October 1, 2005 - September 30, 2006.
(FY06-07 amounts will not be available until after EPSCoR's CPE Annual Report is due.)

KY – EPSCoR Historical Performance

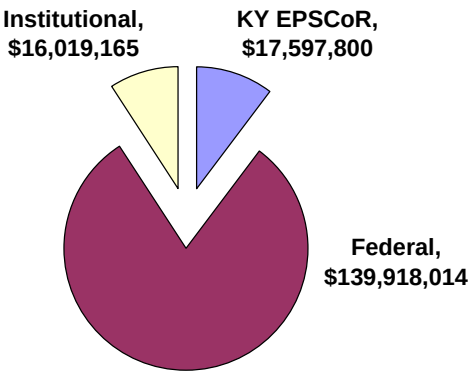
Figure 5 shows in tabular form the progression of research funding obtained by the Commonwealth since the inception of the KY EPSCoR Program. The Program has grown in great part due to the work of the EPSCoR Coalition and support of Kentucky's federal legislators. The EPSCoR Coalition has successfully lobbied for larger EPSCOR-IDeA agency budgets and the KY Statewide EPSCoR Committee maintains a dialogue with Kentucky's Congressional offices on the importance and opportunities captured by the Commonwealth due to the EPSCoR agency programs. **Moreover, the Commonwealth's seven-year investment of $17.6 million has been leveraged approximately eight fold to channel over $139.5 million in federal research dollars to Kentucky over the past seven years.** Total funding (all participating sources) has channeled over $284 million to Kentucky researcher's since KY EPSCoR's inception.

Figure 5. Approximation of Research Funding Secured Through the KY EPSCoR Program

Fiscal Yr	KY EPSCoR	Federal	Institutional	Other	Total	Accumulated Total
85/86	$25,000	$75,000	-	$0	$100,000	$100,000
86/87	$932,162	$837,458	$2,769,598	$0	$4,539,218	$4,639,218
87/88	$825,582	$909,856	$2,423,594	$0	$4,159,032	$8,798,250
88/89	$641,970	$672,929	$1,770,903	$13,000	$3,098,802	$11,897,052
89/90	$660,136	$437,441	$1,429,476	$0	$2,527,053	$14,424,105
90/91	$544,290	$351,392	$1,333,161	$0	$2,228,843	$16,652,948
91/92	$1,327,078	$1,649,314	$2,524,988	$0	$5,501,380	$22,154,328
92/93	$1,317,836	$2,046,139	$2,717,427	$146,000	$6,227,402	$28,381,730
93/94	$1,195,000	$2,680,162	$2,797,656	$0	$6,672,818	$35,054,548
94/95	$764,999	$2,481,391	$2,974,975	$0	$6,221,365	$41,275,913
95/96	$1,530,000	$4,443,707	$6,291,125	$416,000	$12,680,832	$53,956,745
96/97	$1,547,691	$5,593,868	$5,254,401	$0	$12,395,960	$66,352,705
97/98	1777500	$5,945,291	$5,267,851	$153,539	$13,144,181	$79,496,886
98/99	$1,978,300	$13,526,306	$2,691,050	$153,540	$18,349,196	$97,846,082
99/00	$2,550,700	$9,360,845	$479,784	$153,540	$12,544,869	$110,390,951
Subtotals	***$17,618,244***	***$51,011,099***	***$40,725,989***	***$1,035,619***	***$110,390,951***	
00/01	$2,564,600	$11,618,087	$137,275	$0	$14,319,962	$124,710,913
01/02	$2,521,600	$17,069,950	$1,956,547	$0	$21,548,097	$146,259,010
02/03	$2,751,000	$19,080,909	$2,684,092	$40,000	$24,556,001	$170,815,011
03/04	$2,440,900	$19,059,724	$2,395,422	$13,493	$23,909,539	$194,724,550
04/05	$2,439,900	$21,947,452	$2,528,768	$33,000	$26,949,120	$221,673,670
05/06	$2,439,900	$27,116,701	$3,365,052	$33,000	$32,954,653	$254,628,323
06/07	$2,439,900	$24,025,191	$2,952,009	$36,600	$29,453,700	$284,082,023
Subtotals	***$17,597,800***	***$139,918,014***	***$16,019,165***	***$156,093***	***$173,691,072***	
Current Leverage Multipliers =		*8.0*			*9.9*	
TOTALS	**$35,216,044**	**$190,929,113**	**$56,745,154**	**$1,191,712**	**$284,082,023**	
Historic Leverage Multimpliers =		*5.4*			*8.1*	

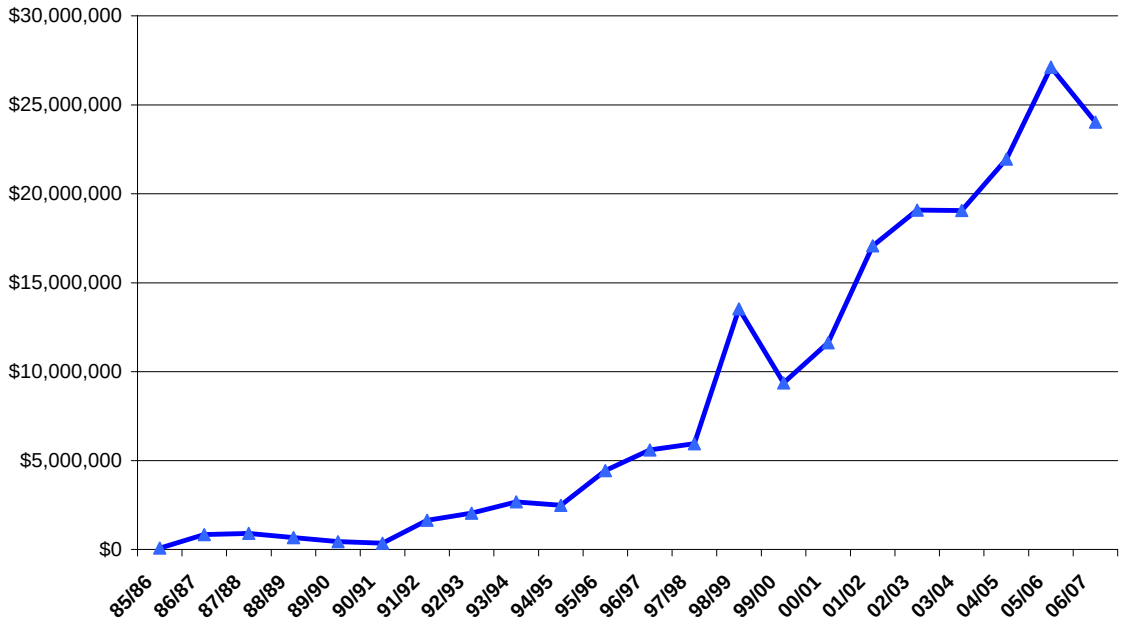
The pie-chart below (Figure 6.) further emphasizes the approximately ten-fold total leveraging of the Kentucky EPSCoR funds in the last seven years per the table details above:

Figure 6. Total EPSCoR Funding to Kentucky 2000-2007



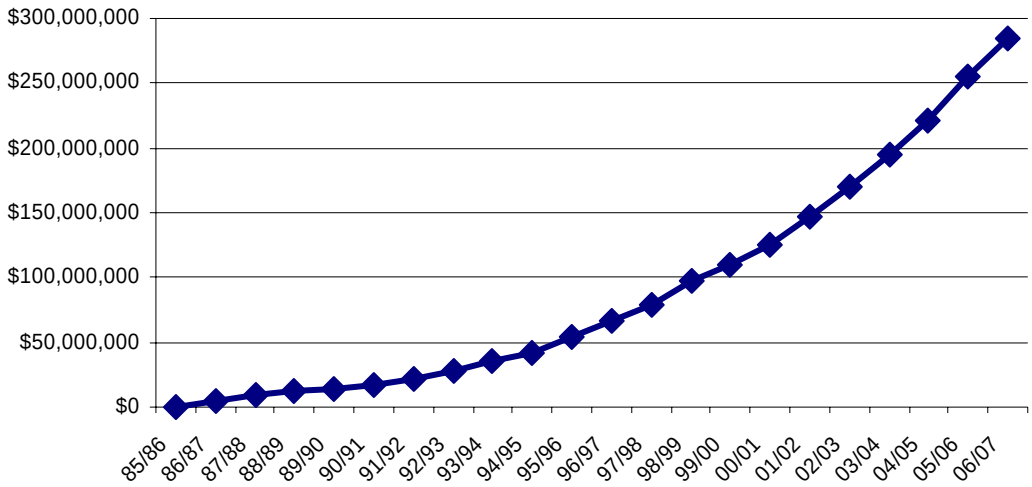
Figures 7 and 8 illustrate the growth of the KY EPSCoR Program and the increased competitiveness of Kentucky's academic researchers. Kentucky continues to perform well in the EPSCOR agency programs even though federal R&D budgets are in general decline and are projected to remain in decline for the remainder of the current administration's term.

Figure 7. Annual Federal Research Funding Secured thru KY EPSCoR Per Year Since Inception



Despite the dip in federal funding received by KY researchers this fiscal year, as reflected in the graph above, KY EPSCoR's accumulated funding continues to grow and is on target to reach the $300 Million mark by FY08(see Figure 8).

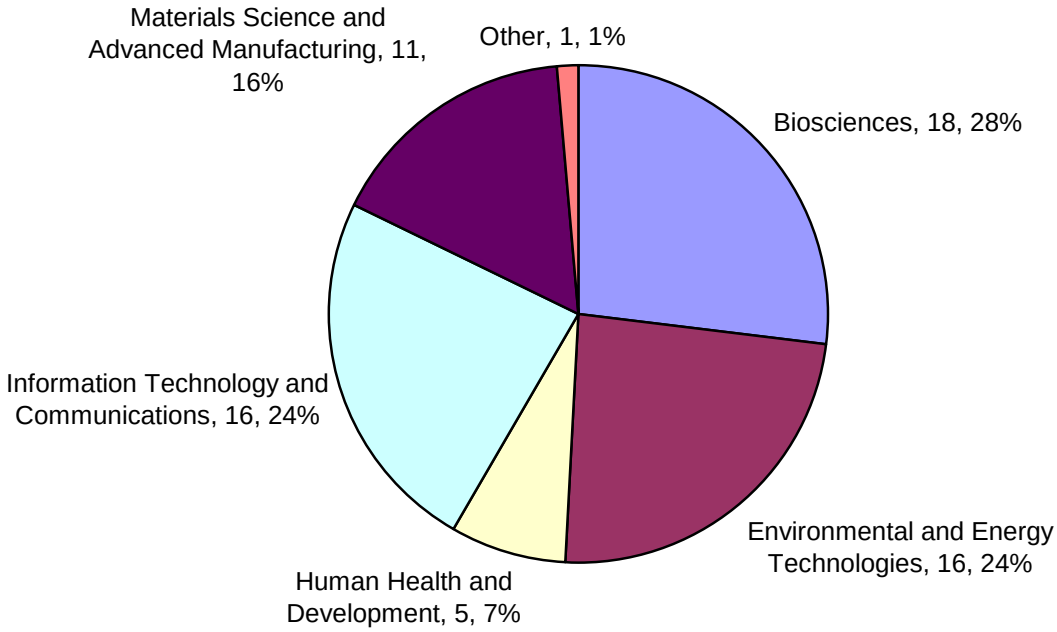
Figure 8. Accumulated Research Funding Secured thru KY EPSCoR Per Year Since Inception



KY EPSCoR Program Investments by Research Focus Area and Kentucky Universities

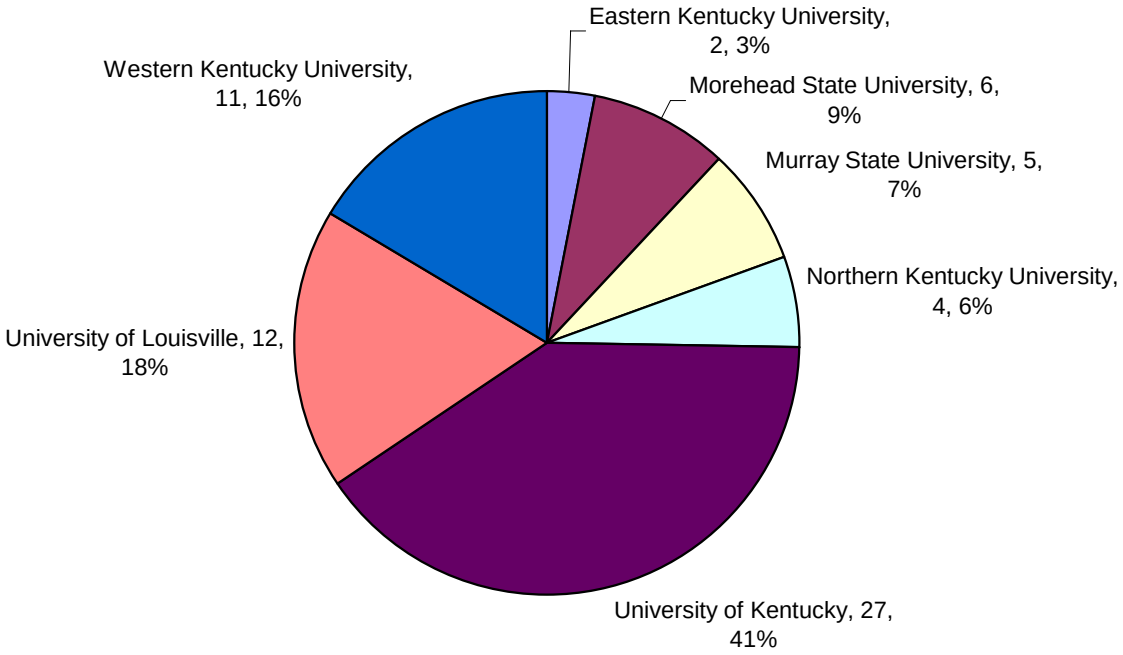
The following pie charts show a breakout of the number of new projects awarded in FY07 by Research focus area (Figure 9a) and by Organization (Figure 9b).

Figure 9a. Number of KY EPSCoR Projects by Research Focus Area (FY07)



(Total number of projects = 67)

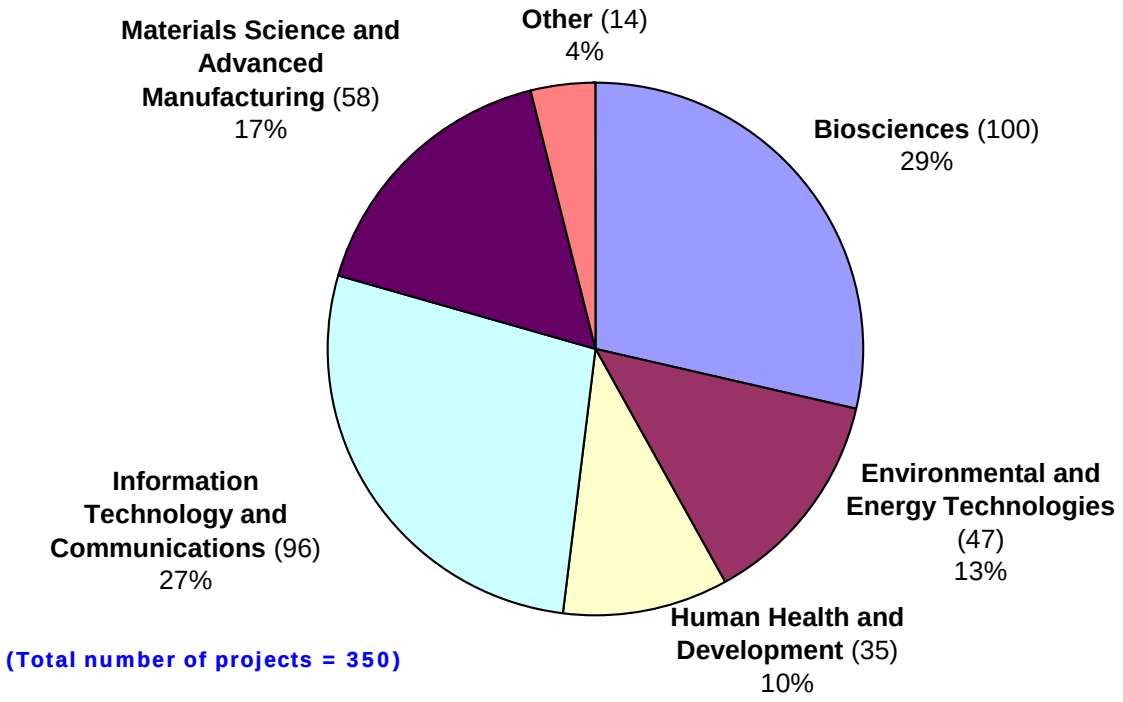
Figure 9b. Number of KY EPSCoR Projects by Kentucky University Award Recipients (FY07)



(Total number of projects = 67)

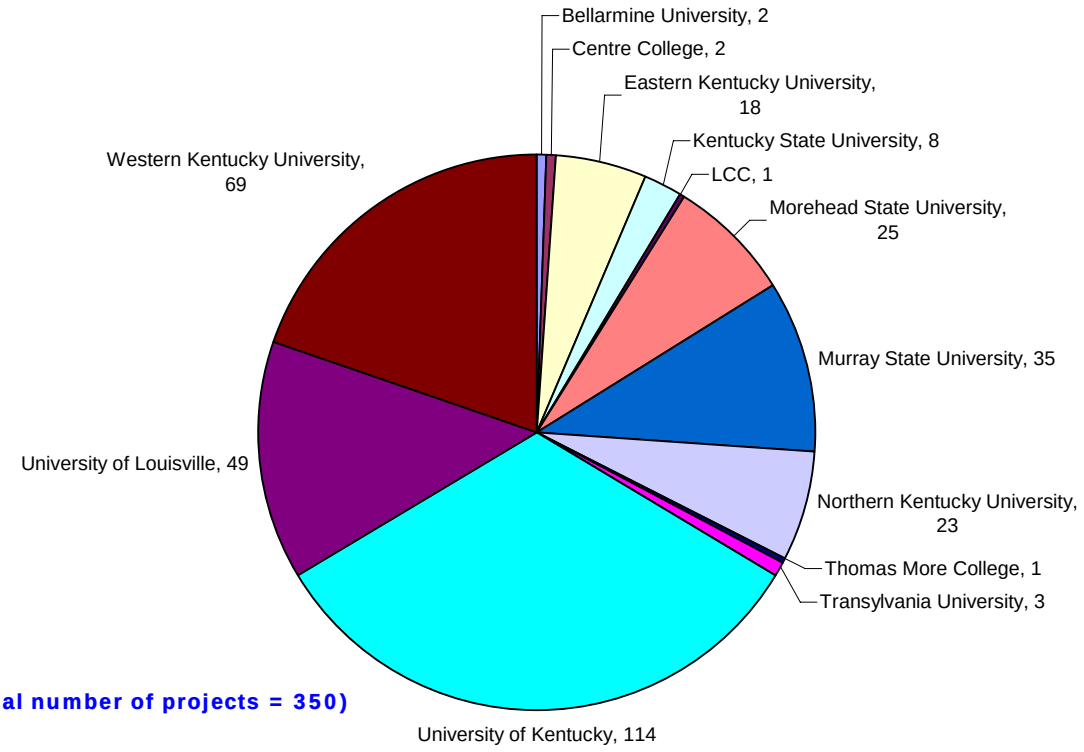
The following four pie charts, 10a, 10b, 10c, and 10d show a distribution of the number and funding amount of KY EPSCoR projects by their research topics and University recipients from the time period of 2001 thru 2007. Although the number of awards documented for FY03-07 is accurate, the number of projects that we were able to identify for FY01 and 02 are under reported due to the data collection methods. With that caveat noted, the following pie charts show the characteristics of 350 KY EPSCoR projects for which we are able to account.

Figure 10a. Number of KY EPSCoR Projects by Research Focus Area (FY01-07)



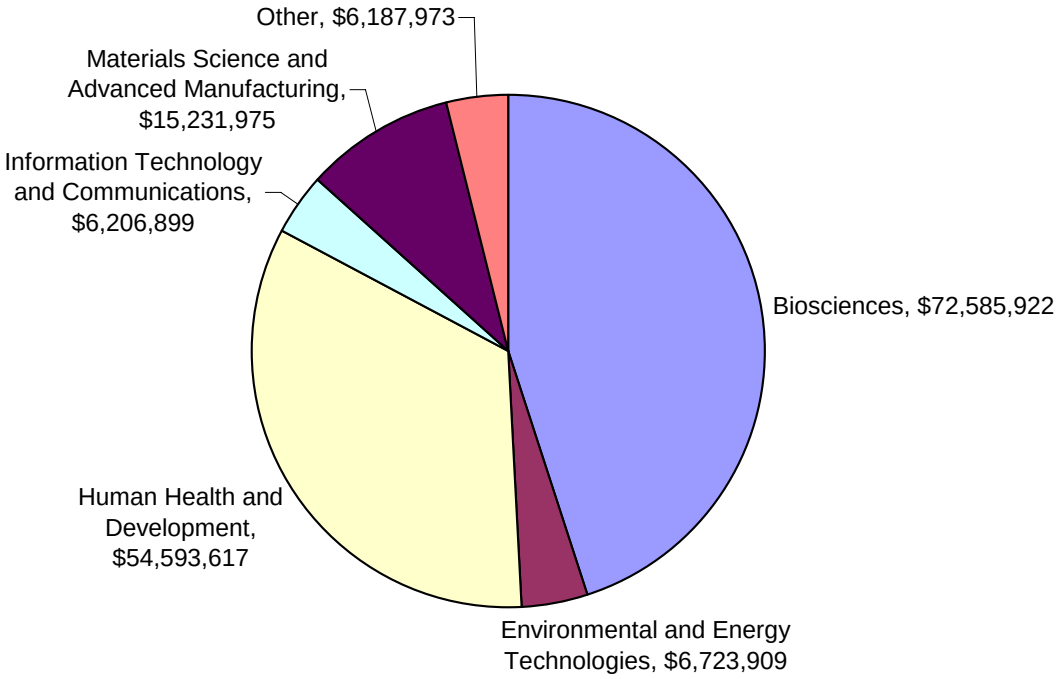
(Total number of projects = 350)

Figure 10b. Number of KY EPSCoR Projects by Kentucky University Award Recipient (FY01-07)



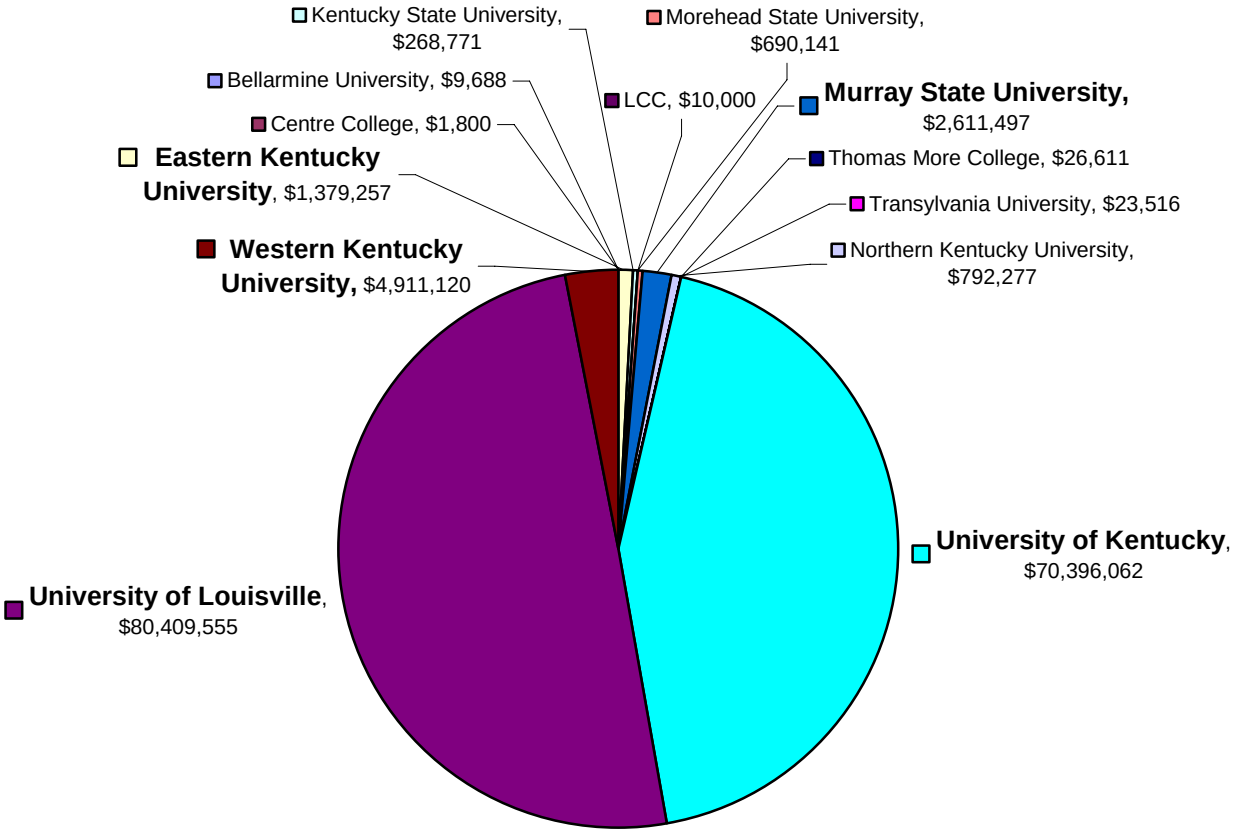
(Total number of projects = 350)

Figure 10c. Funding Amount by Research Focus Area for 350 Trackable Projects (FY01-07)



(Total Funding for 350 Trackable Projects = $161,530,295)

Figure 10d. Funding Amount by KY Award Recipients for 350 Trackable Projects (FY01-07)



(Total Funding for 350 Trackable Projects = $161,530,295)

AWARD IMPACTS

KY EPSCoR continued actions in FY 2007 to collect additional data to better understand the value of KY EPSCoR programs and to aid future decision making by the Statewide Committee. A web-based data collection system called KERS (Kentucky EPSCoR Reporting System) http://kyepscor.kstc.com/kyepscor18/login_form.cfm was initiated in FY 2005 to help capture budget and impact data for all programs including the highly important and rapidly growing NIH IDeA Program. The impact data collected reflects responses from all the EPSCoR programs except USDA. Below is a summary of the impacts collected to date.

Follow-on Funding

The Statewide Committee is highly interested in the ability of EPSCoR awardees to competitively seek and receive follow-on funding. Moreover, follow-on funding is deemed a measure of how well KY EPSCoR is fulfilling its mission of enhancing the research and intellectual capacity of Kentucky's universities and building research infrastructure. Figure 11 presents data reported by KY EPSCoR awardees under both the Infrastructure and Federal Agency Programs with the exception of USDA. The data below is encouraging as it shows over $297 Million in additional research dollars have been secured by KY EPSCoR awardees.

Figure 11. Follow on Funding (FOF)*
(KY EPSCoR Impact Information Reported for FY2007)

KY EPSCoR Agency	Amount Requested **	Amount Awarded	Number of Grants Funded	Not Funded**	Pending	Total Reported
NIH	$167,847,948	$108,463,537	247	29	194	470
NSF	$322,019,958	$71,813,402	220	151	113	484
NASA	$111,899,002	$68,016,983	105	44	30	179
KY EPSCoR Infrastructure	$133,493,442	$23,851,414	83	100	22	205
DOE	$25,371,244	$15,461,740	20	9	5	34
DOD	$22,873,937	$9,273,510	16	1	4	21
EPA	$317,000	$317,000	1	0	0	1
USDA	dna	dna	dna	dna	dna	dna
	$783,822,531	$297,197,586	692	334	368	1394

* Proposal submission and award dates range from 2002 to 2007 with funding periods from 2002 to 2015.

** The 'Requested' and 'Not Funded' amounts may be under-reported due to a limited availability of summary data on non-funded proposals from some agencies.

Jobs Created

The infusion of research dollars into Kentucky's universities does create jobs. Including the impact of a major funding source (NIH-IDeA), the KY EPSCoR awardees reported in Figure 12 the number of research related jobs that resulted in part or full due to the award. The numbers below cover job creation reported during FY04 thru FY07.

Figure 12. Jobs Created as a Result of KY EPSCoR Awards*
(KY EPSCoR Impact Information Reported for FY2007)

KY EPSCoR Federal Agency	Full Time	Part Time	Total Jobs
NIH	168	34	202
NASA	67	95	162
NSF	22	76	98
Infrastructure	12	26	38
EPA	3	4	7
DOD	2	6	8
USDA	**dna	**dna	**dna
	274	241	515

** Data Not Available

* Data reported from FY03-04 - FY06-07

Publications

Publications and presentations represent a classical measure of research productivity. Since primarily 2003, over seventeen hundred articles have been written and published to communicate the results of the project outcomes to the public at large. Awardees report an impressive number of 100 new book chapters which support the concept that through our research we are playing a roll in re-writing our knowledge base.

In addition to the published works below, EPSCoR awardees reported 145 pending manuscripts.

Figure 13. Number of Manuscripts Published by Type*
(KY EPSCoR Impact Information Reported for FY2007)

Manuscript Type	Published Works *
Journal Article	1150
Abstract	276
Book Chapter	100
Conference Proceedings	85
Conference Paper	56
Thesis	23
Dissertation	11
Other	7
Book	6
TOTALS	1714

* Publication dates range primarily from 2003 to 2007 with a few works prior to 2003.

Presentations: In addition to the publications above, EPSCoR investments have contributed to the development of just over 2,000 scientific presentations to local, regional, national, and international audiences between primarily 2003 – 2007.

Patents: Investments have generated a total of 47 patent related activities including 18 invention disclosures and 29 patent applications and provisional patent filings reported by the NASA, NSF, DOD, NIH subcommittees that have led to 5 patents being issued and 2 being licensed. The reported patent activity covers a time period from 2002 – 2007.

Equipment: From the awards given, KY EPSCoR researchers are able to build infrastructure for the state. Figure 14 below shows that between 2002-2007 the purchase of almost $13 million dollars in equipment has contributed to this aim.

Figure 14. Equipment Purchased by KY EPSCoR Awardees*
(KY EPSCoR Impact Information Reported for FY2006)

KY EPSCoR Federal Agency	Equipment Total Cost	Number of Items Purchased
NSF	$10,461,190	222
NIH	$1,805,598	133
Infrastructure	$468,739	55
NASA	$126,900	1
DOE	$33,613	2
DOD	$18,500	3
EPA	$0	0
USDA	**dna	**dna
	$12,914,539	416

** Data Not Available

* Data primarily purchased between 2002 - 2007

The Impact of People:

The impact of the KY EPSCoR program has extended its reach both within the local community and out to the global community of researchers. Between 2001 – 2007, 465 principle investigators including PI's and Co-PI's have received EPSCoR awards. From these awards collaborations have been formed with 712 researchers located in 26 different countries and 36 of the 50 United States plus Washington DC. Additionally, over 1800 personnel including undergraduates, graduates, post-docs, faculty, staff and others have supported these projects. Tables 15 -17 below summarize these connections.

Table 15. Research Collaborations

Locations of Collaborating Researcher	
Australia	Japan
Austria	Kazakhstan
Belgium	Mexico
Canada	Portugal
Chile	Romania
China	Russia
Egypt	Slovakia
France	Spain
Germany	Sweden
Greece	Switzerland
India	Taiwan
Israel	United Kingdom
Italy	Venezuela

Number of Collaborations **	
Global	64
USA	648
Total	712

** Reporting Period 2003-2007

Table 16. Project Personnel

Personnel Position	Number *
Undergraduate	756
Graduate Student	525
Faculty/Research Scientist	245
Research Associate/Post-Doc	143
Staff/Technician	133
Other	40
Private Sector/Industry	7
Total	1849

* Reporting period 2001-2007

Table 17. Total Number of People Impacted by KY EPSCoR Funding

People	Number ***
Principle Investigators	465
Collaborators	712
Project Personnel	1849
Total	3026

*** Reporting Period 2001 - 2007

Research Highlights

The collective impacts of EPSCoR are impressive and praiseworthy. Many EPSCoR success stories, however, are better told in brief story format. A few recent and relevant highlights are summarized below for each of the EPSCoR Federal agencies:

KY DOE EPSCOR

The KY DOE EPSCoR program won a competitive $1.9 Million award from DOE at the close of this fiscal year. Although the sub-projects are still being initiated, the award will span three years and be split between the University of Kentucky and the University of Louisville. The award focuses on the use of nanomaterials for converting solar radiation and residual thermal energy into electrical energy and hydrogen. The outcome of the research will provide information on new energy conversion technologies in the following areas:

- Carbon Nanopipette Field Emitters for Thermal to Electric Energy Conversion
- Nanoscale Architectures of Multi-Junctions for Light Harvesting
- PEC Cells for Solar Hydrogen Production
- Nanowire Based Architectures for PEC Solar Cells
- Integrated Energy Storage Using Oriented Carbon Nanotube Membranes
- Computational Studies of Electronic Structure of PEC Electrode Materials

KY EPSCoR Infrastructure Program

Getting a Big Buy-in From a Global Industry

On April 1, 2004, University of Kentucky College of Engineering researcher Kozo Saito received a $20,000 Research Collaboration Grant from KY EPSCoR for the purposes of expanding the existing Industrial Application and Engineering Science (IAES) group activity to an International Center. Saito's group was able to achieve this goal with the following steps:

- Through the award funding, they sponsored an annual Painting Technology Workshop where over 70 people, most from major automobile companies and paint equipment suppliers attended.
- Secondly, they submitted a proposal to KY's Department of Commercialization and Innovation program which was funded for $1.2 Million towards the establishment of the center.
- Thirdly, they sponsored a UK executive luncheon during World EXPO 2005 in Aichi Japan in May 2005, where over 50 executives from Major Japanese companies attended.

As a result, several Japanese companies provided research grants to UK's IAES group. Toyota Headquarter Japan also increased their funding. Most recently, in a press release issued on March 6, 2007, Toyota Motor Engineering and Manufacturing North America Inc. (TEMA) gave $1 Million to the group in support of the new center which will be named the Institute of Research for Technology Development (IR4TD). The institute will focus on laser diagnostics, paint inspection, wet spray paint, computational fluid dynamics, to name a few, and will include a prototype testing unit for automobile surface coating and other applications.

The outcome of Dr. Saito's relatively small grant demonstrates the potential of the KY EPSCoR infrastructure program for creating an interactive environment out of which collaborations can lead to multi-million dollar, international success stories. (See Attachment 1 for a March 6, 2007 University of Kentucky News article showcasing the award.)

KY DOD EPSCOR

Improved Technology to Detect Landmines

University of Louisville researcher Dr. Hichem Frigui received a three year, $50,000 DEPSCoR award on June 1, 2005 . With the funding provided, he developed algorithms to work in conjunction with Ground Penetrating Radar (GPR) technology for improved detection of landmines. The work brought him in collaboration with the countermine division, US Army Night vision lab, and the industries NIITEK inc. and BAE systems. These collaborations have resulted in the development of software systems that have been integrated in GPR landmine detection systems. Some of these systems are being field tested by the government. Others have already been deployed in hostile regions of the world for both humanitarian and military applications. NIITEK cites over 80 million landmines buried around the world. Undoubtedly, the algorithm advancements produced by this project will help to save lives and lessen the hidden potential for destruction. (See Attachment 2 for the testimonial letter from NIITEK on the significance of Dr. Frigui's work supported by a DOE EPSCoR grant.)

KY NSF EPSCOR

Univ. of Kentucky Supercomputer Ranks 1st Among EPSCoR States, 8th Nationally, July 14, 2007

A 2007 ranking of Supercomputers from top500.org places the University of Kentucky first among public universities in EPSCoR states and eighth among public universities nationwide. UK has surpassed the likes of other well equipped public and private universities such as Brigham Young University, Virginia Tech, and Harvard University. The list, released at the June 2007 International Supercomputing Conference in Dresden, Germany, ranks UK's supercomputer 66th in the world among all competitors from both public and private institutions and research centers. Top500's rankings are based on the machines' performance using Linpack benchmark computer code.

University of Kentucky's Supercomputer

UK's state-of-the-art IBM System Cluster 1350 offers a peak performance of 16 teraflops of calculation capacity, handling up to 16.3 trillion calculations per second. The Center for Computational Sciences currently houses and maintains the system. It was formed in 1987 from EPSCoR funds, requested by a

Computational Sciences focus group at the University. The high-powered machine has been utilized among its faculty in many noteworthy research projects. Three of them are detailed below:

- Peter Spielmann, associate professor of molecular and cellular biochemistry, is investigating how DNA repair systems recognize damage within cells. He is currently completing a project titled Synthetic Probes of Protein Prenylation with a $1.2 million multi-year grant from the National Institute of General Medical Sciences
- Madhu Menon, associate director of the Center for Computational Sciences, conducts computational simulations that allow him to identify and predict the optimal atomic structures of nanowires. In 2007, Dr. Menon received an award for $119,000 from the Defense University Research Instrumentation Program to purchase a SGI Altix computational device to aid in his research.
- Christopher Jaynes, former professor of computer science, is investigating wide-area video surveillance. In 2005, Jaynes received a Phase I Small Business Innovation Research grant for $100,000 to form Mersive Technologies and continue his research in the private sector.

Zoologist Builds Genomics Program at UK, July 1, 2007


Far Left - Dr. S. Randall Voss

Focused EPSCoR investments continue to develop infrastructure in Kentucky and throughout the nation by supporting high caliber research activities. These initial investments are paying off in the form of additional follow-on funding grants that EPSCoR scientists bring to their state and institution. Dr. S. Randal Voss, Associate Professor of Biology and Director of the Ambystoma Genetic Stock Center at the University of Kentucky (UK), is a brilliant example of EPSCoR's impact and potential for success.

Beginning with his pursuit of a Ph.D. in Zoology at Clemson University, he has benefited from numerous EPSCoR funds. As a graduate student, Dr. Voss received a research assistantship that was created through an award from South Carolina EPSCoR. This opportunity allowed him to conduct research using state-of-the-art equipment in the area of biotechnology. This opportunity further led to his receiving a NSF Dissertation Improvement Grant and Clemson's prestigious R.C. Edwards Award that recognizes outstanding graduate student research. Since receiving his first EPSCoR award, Voss has received over 5 million dollars in follow-on funding. Voss, himself, is surprised by that total. "Until now, I'd never really done the math," he said.

Dr. Voss was recruited to UK through a Kentucky NSF EPSCoR start-up package and has been at the institution since 2002. According to Voss, the opportunity to build a program in Genomics at UK enticed him to make the move from Colorado State University. The Genetic Stock Center (which serves national and international interests) and its participation in the Salamander Genome Project put Voss on the cutting edge of biomedical research on: regeneration, vision, neural transmission, renal function, embryogenesis, heart development and olfaction.

Upon his arrival at UK, Dr. Voss brought with him a NSF Career Development Award to integrate genomics in research and teaching. He has already formed collaborations with researchers at UK and across the state, including Dr. Steven Richter who recently accepted a position at Eastern Kentucky University. Dr. Voss is collaborating with researchers from high-profile places like the Salk Institute, UC-Irvine, UC-Davis, and U. Washington. He is also in collaboration with researchers from smaller institutions like Mount Union College in Ohio and Minot State U. in North Dakota; another EPSCoR state. He is currently funded by the NSF, NIH, and the Kentucky Spinal Cord and Injury Research Trust.

EPSCoR Helps Catapult UK in National Ranking March 1, 2007

The University of Kentucky's (UK) Department of Molecular and Cellular Biochemistry is currently 12th in a nationwide ranking of public medical schools by department. It has vaulted to this position from 20th in only 2003. This information is provided by the National Institutes of Health (NIH), which has more than doubled its funding to UK over the last four years.

Financial support from KY NSF EPSCoR, from 2002-2005 via an RII Infrastructure Initiative in biochemistry/proteomics, was instrumental in helping to bring about this success. Two UK researchers,

Drs. Zhu and Chi, were recruited to the university with KY NSF EPSCoR start-up packages as part of the EPSCoR initiative to develop a nationally recognized center-of-excellence in proteomics research. The NIH rankings reveal outstanding progress toward this goal. Their participation was also essential in securing an additional $10 million in funding via a NIH COBRE (Center Of Biomedical Research Excellence) grant. Successfully attracting competitive research funding from the National Science Foundation has also provided substantial momentum and support to the researchers.

DNA Strands

Prior to EPSCoR funding, the Biochemistry department ranked nearly 30th among public colleges and universities nationwide. However, after receiving the award, it's moved into the top twelve. This example of EPSCoR as a catalyst for ensuring long-term competitiveness is a model one for effectiveness.

New Research Scholars Program Aimed at Increasing Student Participation, February 16, 2007

A new program launched by Kentucky NSF EPSCoR is designed to increase undergraduate and graduate participation in science, technology, engineering and math majors at institutions throughout the state. Students from any post-secondary school in the state are eligible to participate. The Kentucky NSF EPSCoR Research Scholars Program provides financial support for primarily underrepresented students conducting research in areas congruent with RII initiatives. Currently, these areas change on a rotating, three year basis. Through May 2008, EPSCoR is funding research in nanotechnology, visualization and virtual environments, metabolomics and environmental science. Researchers in these projects are based at Kentucky State University, the University of Kentucky, the University of Louisville and Eastern Kentucky University.

left to right: Marcello Cavitt, Josh Campbell, Nichole Sonderman, Dr. Cecilia Yappert, Rosslyn Steinmetz

Current RSP awardees are active at the local, state, national and international level in their fields. They have made presentations at national and international conferences, contributed to published articles and were able to devote additional time to research through RSP grant money.

KY NASA EPSCOR

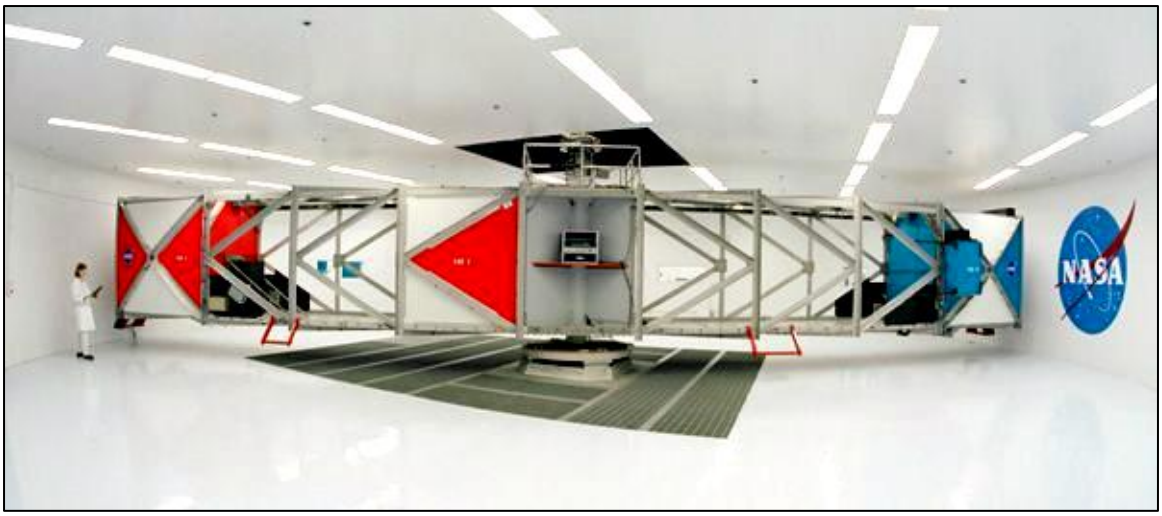
Countermeasures and Sensors for Human Commercial and NASA Space Travel

On June 8, 2007, University of Kentucky researchers Dr. Charles Knapp and Dr. Leonidas Bachas received the green light from NASA Headquarters to enter an unprecedented seventh year of their studies of countermeasures and sensors that will help make human commercial space travel a reality as well as advance NASA human exploration. Countermeasures are protocols to lessen the deleterious effects of being weightless. Centrifuge studies help define those protocols. The Kentucky team continues to collaborate with NASA scientists at Ames Research Center, with which the Commonwealth of Kentucky has a formal agreement with permanent offices at the Center. The work of the Kentucky researchers has been of such import to the Research Center that Ames has directed Center funds to Kentucky, another unusual occurrence. Additional work has been, and will be, done in collaboration with Johnson Space Center partners. A major goal of NASA is to have the projects they fund contribute to their future workforce. One of the students, who was trained in this project is now employed in the Cardiovascular Lab at the Johnson Space Center. One of his responsibilities includes monitoring the health of the astronauts upon their return to earth at the Space Shuttle landing site.

In summary, this project is responsible for

- Bringing extra funding to Kentucky
- Providing strategic workforce to the Nation, and
- Placing Kentucky at the center of recognition of expertise in this area of human space flight

(See photo on next page)



NASA 20G (variable radius) Centrifuge at NASA Ames Research

KY NIH IDeA Program

The NIH IDeA program stands out as KY EPSCoR's largest EPSCoR related federal research program bringing $15.6 million into the state this fiscal year through 7 awards received between the Universities of Louisville and Kentucky. Two of the awards have been successful enough thus far to win competitive renewals which will take them out to 2010. Collectively, the anticipated total budget of theses 7 awards over their projected terms comes to $108.2 Million. The 7 awards and their FY07 funding levels are summarized below:

6 COBRE: **Centers of Biomedical Research Excellence:**

At the **University of Louisville**:

Focus	FY07 Budget	Term
• Spinal Cord Injury	($2.1 Million,	2000 – 2010)
• MolecularTargets	($2.1 Million,	2003 – 2008)
• Birth Defects	($1.5 Million,	2002 – 2007)

At the **University of Kentucky**

Focus	FY07 Budget	Term
• Women's Health	($2.4 Million,	2000 – 2010)
• Human Disease	($2.1 Million,	2004 – 2009)
• Oral Health	($2.2 Million,	2000 – 2010)

1 INBRE: **KY-IDeA Networks of Biomedical Research Excellence**

At the **University of Louisville**:

Focus	FY07 Budget	Term
• Collaborative Network of Biomedical Researchers from 13 institutions in KY	($3.3 Million,	2001 – 2009)

One of the primary objectives of the COBRE award is to train junior faculty and enhance their success for competing for external funding. Dr. Thomas Curry's award provides an excellent example of success in this area:

> **Center of Biomedical Research Excellence in Women's Health,** PI: Thomas Curry, UK
>
> The COBRE program in Women's Health has been extraordinarily successful in its research endeavors and the training of junior faculty. The COBRE-WH has met the specific benchmarks outlined for the program which include: 1) acquisition of independent status by our junior investigators, 2) competitiveness of these investigators for external peer-reviewed research grant support, 3) establishment of a critical mass of investigators, and 4) development of the scientific and administrative infrastructure.

The Program's success in mentoring junior investigators to become independent, extramurally supported investigators is evident by the 9 scholars who have received funding. During the initial period (September 2000-August 2005), 7 junior faculty received independent RO1 or R15 funding from NIH, another 7 faculty members obtained NIH awards such as RO3's or K Awards, and another faculty member received a grant from the National Science Foundation. In addition, these faculty also received 9 grants from various foundations such as the American Heart or American Cancer Society.

During the past year (Year 7 of the current grant funding period), we have had one faculty receive an RO1, another faculty receive a R21 with an additional 4 NIH RO1s, 2 R21s, 2 RO3s and an American Cancer Society grant submitted. Thus the COBRE has provided the environment and infrastructure to successfully mentor our junior investigators to become independent, extramurally funded scientists.

In addition to training junior faculty, each award sets their focus on several primary areas of research. Below, Dr. Ebersole outlines a few of the recent breakthroughs in their COBRE for oral health.

Center of Biomedical Research Excellence in Oral Health Research, PI: Jeffery Ebersole, UK

Three of the five areas of particular interest are highlighted below to represent the accomplishments of the COBRE.

(1) Oral Bacterial Reactivation of HIV: Dr. Huang's research project has clearly delineated the ability of oral bacteria related to periodontal disease to reactivate HIV from latently infected T cells, macrophages, and dendritic cells. This finding has potential importance related to the ability to manage HIV as a chronic disease using HAART regimens. The potential that chronic oral bacterial infections jeopardize the effectiveness of HAART emphasizes the importance of preventive oral health evaluation and management in HIV patients.

(2) Gestational Diabetes: Risk of Periodontal Disease and Pregnancy Complications: Dr. Karen Novak's research project has shown that within the population of gestational diabetes expectant mothers, particularly those from low SES rural communities, there is a level of chronic periodontal infections that would be proposed to increase the risks for the mother and fetus for adverse pregnancy outcomes. The data that will continue to be generated should provide solid evidence for the necessity to include oral health treatment as an integral part of prenatal care.

(3) Dental Disease and Dementia: This research project has identified a significant relationship between missing teeth in elderly subjects and the prevalence of dementia and Alzheimer's disease. This study utilized clinical data form the "Nun Study" to identify this relationship. Extensions of these findings are being examined regarding various clinical measures of periodontal disease. These data provide some seminal information regarding the potential contribution of chronic oral infections to adverse neurological changes with aging.

In the area of securing external funding, Dr. Greene explains below the crucial role the IDeA award has played in their achievements:

Molecular Determinants of Developmental Defects, PI: Robert Greene, UofL

"Significant progress has been made toward establishing our center such that we are poised to compete independently for external peer-reviewed center or program project grant support. Since the recruitment of the Program Director, Robert Greene, to the University of Louisville, a total of nine (9) new faculty positions have been committed to the establishment of the Birth Defects Center. Five (5) of these represent new hard money, tenure-track faculty lines that were part of the initial recruitment package for the Program Director, two (2) additional positions were made available during the initial COBRE funding period as part of the institutional commitment to the COBRE, and two (2) additional faculty positions, representing the current and sustained commitment from the university, have been pledged as part of this competitive renewal application. This commitment has enabled the Birth Defects Center to recruit and develop a cadre of junior and senior faculty necessary to become nationally competitive for funding in the area of birth defects research."

"COBRE support has thus been critical in 1) the successful establishment of a thematic multi-disciplinary center focused on the causes of developmental disabilities, 2) the recruitment and retention of the above-mentioned investigators to the Birth Defects Center where 3) they have

functioned as a collaborative, synergistic and independently funded group of investigators, now able to compete independently for P01 and (when announced) appropriate P50 type awards. "

Alongside the six research centers established by the COBRE awards, the INBRE award offers a channel to connect researchers to create a strong network of support. See Dr. Cooper's award below for an example of the breadth of the beneficiaries:

KY-IDeA Networks of Biomedical Research Excellence (INBRE), PI: Nigel Cooper, UofL

INBRE is a collaborative network of biomedical researchers in state-supported and independent institutions of higher education within Kentucky. The network was initiated with the aid of an NIH-IDeA-BRIN grant from the National Center for Research Resources in 2001. The goals of this unique collaboration were to: develop the network, fund research infrastructure, provide resources to aid faculty development and to fund faculty initiated research projects, encourage students to become engaged in research and to consider graduate education in the biomedical research arena. The network includes the following institutions:

- Bellarmine University,
- Berea College,
- Eastern Kentucky University,
- Kentucky State University,
- Morehead State University,
- Murray State University,
- Northern Kentucky University,
- Pikeville College (Osteopathic Medicine),
- Transylvania University,
- University of Louisville,
- University of Kentucky,
- Kentucky Wesleyan College,
- Western Kentucky University.

Accomplishments include: 1) the recruitment of Dr. Eric Rouchka, UofL's first bioinformatics hire involved in gene database development and teaching of an 'Introduction to Bioinformatics' class; 2) development of a joint Masters Program in Bioinformatics between the University of Louisville and Eastern Kentucky University; 3) installation of a 16 node, 32-CPU Dual AMD 2400 computer cluster in the Dahlem supercomputing laboratory of the Speed Engineering School at the University of Louisville; 4) development of a multiple primer design tool; and 5) recruitment of Qiang He to aid in statistical analysis of gene-microarrays.

The Bottom Line

EPSCoR and National Competitiveness

Kentucky is showing verifiable progress in its pursuit of competitiveness on a national scale. Two recent reports from independent sources confirm Kentucky's progress in attracting federal Research and Development (R&D) dollars.

A 1999-2003 report from the State Science and Technology Institute (SSTI) details federal obligations to colleges and universities nationwide. This report confirms that federal obligations for Kentucky have increased in that time by 84.72%. This nearly doubles the national growth average of 47.61% in that same period. The most recent rankings show Kentucky ranking 29th nationally. The state has climbed four state spots in the rankings since 2002--making it the only state in the country to do so.

EPSCoR states are collectively gaining ground in competitiveness for federal obligations. According to the same SSTI information, the top five performers are exclusively NSF EPSCoR states. Further, fourteen of the top fifteen (in terms of percentage growth) are EPSCoR jurisdictions. The full SSTI ranking of states can be viewed at: (http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf06309) .

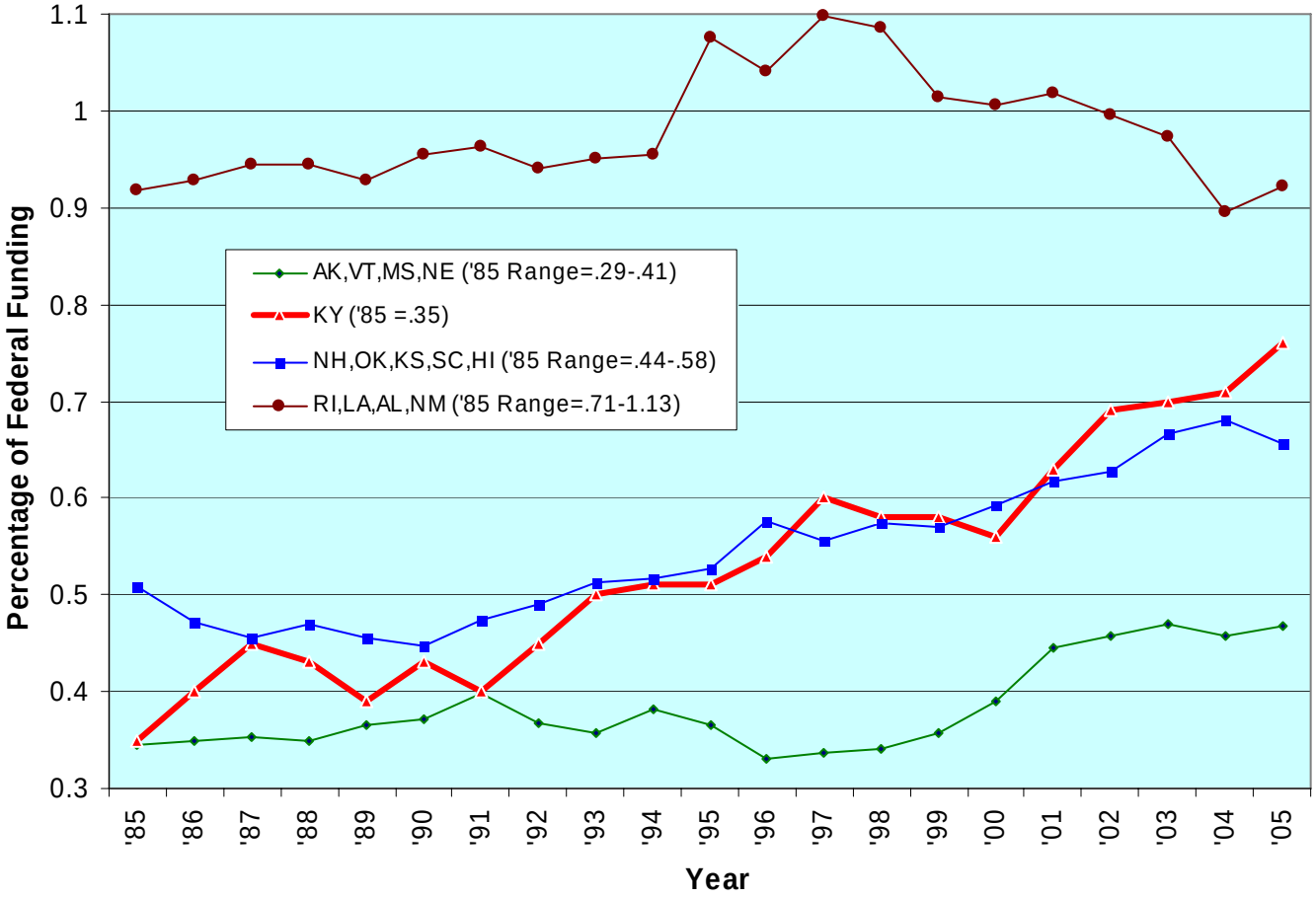
In addition to the SSTI report, a 2005 NSF survey of R&D expenditures at colleges and universities shows Kentucky's percentage of the national total to be about .76% -- more than double the percentage received 20 years ago when Kentucky first joined EPSCoR. (See Attachment 3 for the NSF table listing all States and their percentage of federal funds for the last 20 years.)

Summarizing the survey in chart form, Figure 19 below shows Kentucky's progress (in red) over that time and compares the state's growth with other groupings of EPSCoR states. The cohorts were originally grouped based on the 1985 percentage of their total federal academic distributions. For example, Kentucky received 0.35% of these expenditures, which was the average of Kentucky and four other EPSCoR states (in green). The chart shows that even though both EPSCoR cohorts improved their percentage over this period of time, Kentucky actually grew much faster than its peers in the smaller

distribution group. By 2005, Kentucky had exceeded the average of the next largest cohort of EPSCoR states (in blue) and is quickly approaching the average percentage distribution of the top EPSCoR jurisdictions (in brown).

Figure 19. Comparison of the EPSCoR States Federally Financed Academic R&D Expenditures

(Shown as a percentage of the total annual federal funding for all academic R&D)



Cohorts reflect averages.
Data Source: NSF Survey of R&D Expenditures at Colleges and University (webcaspar.nsf.gov)

Attachments

1. News Article from the University of Kentucky:
   March 6, 2007 , Toyota Gives $1 Million to Establish Tech Development Institute.

2. Letter from NIITEK:
   June 18, 2007, Testimonial on the significance of Dr. Frigui's work supported by a DOE EPSCoR grant.

3. Table from NSF Survey:
   Listing all States and their percentage of federally financed academic R&D expenditures for the last 20 years

Toyota Gives $1 Million to Establish Tech Development Institute

Attachment 1

Media Contact: Dan Adkins [dradki1@email.uky.edu?subject=[NEWS] RE:Toyota Gives $1 Million to Establish Tech Development Institute], (859) 257-3303, x228

LEXINGTON, Ky. (March 6, 2007) − Toyota Motor Engineering and Manufacturing North America Inc. (TEMA) has given $1 million to the University of Kentucky College of Engineering to support a new Institute of Research for Technology Development (IR4TD) in the college, pending acceptance and approval by the UK Board of Trustees.

The new institute will explore and develop new technology aimed at increasing productivity, performance and profitability in a variety of manufacturing industries. The institute will be headed by Kozo Saito, a UK engineering professor with a longstanding relationship with Toyota who has performed research to improve painting efficiency in the manufacturing process.

"This gift continues and deepens UK's relationship with Toyota. It further builds the kind of university-industrial partnership that we at UK believe is essential to creating a foundation for 21st century prosperity in the Bluegrass State," said UK President Lee T. Todd Jr.

"It also demonstrates Toyota's confidence in UK's researchers to help that company continue to make products that have made it a worldwide leader," Todd continued.

Also present at the announcement of today's gift was Seiichi Sudo, the president of TEMA in Toyota's North America operations.

"I'm proud to say today that the University of Kentucky-Toyota partnership is stronger than ever and we are excited about the development of the UK Institute of Research for Technology Development," Sudo said.

"It is our hope that the institute will help other industries add new technologies to meet changing needs in today's manufacturing world," Sudo added.

The gift qualifies for matching funds from the state's Research Challenge Trust Fund.

The IR4TD will operate labs both on campus and in the former Lexel Building at Coldstream Research Campus. The labs will focus on laser diagnostics, paint inspection, wet spray paint, computational fluid dynamics simulation, conceptual design and nanomaterial synthesis. The facility also will include a prototype testing unit for automobile surface coating and other applications.

The institute will develop products such as the Vorticone®, a system that captures excess paint from the manufacturing process and prevents it from being shed into the environment.

The new institute also will pursue new technology useful in production of carbon nanotubes, steel, aluminum, environmental pollution prevention equipment from coal-fired power plants and fire safety equipment.

NIITEK

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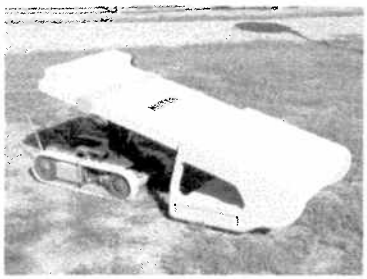

June 18, 2007

Mr. Hichem Frugui
University of Louisville
Department of Computer Engineering and Computer Science
448 Lutz Hall
Louisville, Kentucky 40292

Dear Hichem:

NIITEK would like to acknowledge the tremendous work you have done to advance the cause of explosive and landmine detection on vehicle mounted systems. As you know, landmine detection is one of the greatest threats to mankind in the 21st century. There are over 80 million landmines buried around the world and this number continues to grow as conflict zones in the world expand. At NIITEK, we have been focused on solving this problem since 1998 and we are extremely grateful for your support.

Together, we have made significant advances in the use of Ground Penetrating Radar technology and software methods to detect low metal content landmines. As you probably know, we are currently involved in building and deploying GPR landmine detection systems in hostile regions of the world for both humanitarian and military application. Your work in software algorithm methods has helped NIITEK advance the development of these systems.

All of the vehicles pictured above have benefited from your work and will shortly contribute to helping save lives. Specifically:

- Developed HMM and EHD algorithms. EHD is the top performing algorithm and HMM comes close second.
- Developed spectral features.
- Developed fusion methods.
- Developed ground tracking algorithms.
- Developed trainable classifiers on AMDS program.

Finally, we hope to deploy the Husky this year in theatre. This has certainly been enhanced by your work and contributions. You can be proud that together we will have a very real sense of accomplishment when our systems help to "Save a Solider" in the very near future.

Again, thank you for your support.

Best regards,

Fred Clodfelter

Fred Clodfelter
Chief Executive Officer

NSF Survey of R&D Expenditures at Colleges and Universities

Federally Financed Academic R&D Expenditures (webcaspar.nsf.gov/)

Year	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05
Virgin Islands	0.01	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.02	0.01	0.01	0.03	0.05	0.04	0.04	0.04
Guam	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03
South Dakota	0.04	0.08	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.09	0.1	0.11	0.13	0.15
Wyoming	0.12	0.14	0.12	0.14	0.15	0.13	0.12	0.12	0.12	0.12	0.12	0.11	0.1	0.12	0.12	0.09	0.1	0.09	0.09	0.08	0.1
Montana	0.16	0.14	0.16	0.17	0.14	0.14	0.15	0.18	0.19	0.21	0.22	0.23	0.24	0.25	0.27	0.29	0.29	0.3	0.34	0.35	0.39
Delaware	0.18	0.19	0.19	0.17	0.2	0.19	0.2	0.21	0.23	0.24	0.21	0.23	0.24	0.24	0.23	0.23	0.23	0.23	0.3	0.29	0.27
Maine	0.18	0.13	0.11	0.09	0.09	0.1	0.1	0.08	0.08	0.1	0.13	0.13	0.11	0.09	0.13	0.14	0.13	0.12	0.13	0.14	0.11
North Dakota	0.19	0.19	0.21	0.2	0.22	0.22	0.21	0.22	0.21	0.22	0.21	0.26	0.17	0.15	0.16	0.17	0.16	0.21	0.27	0.3	0.27
West Virginia	0.2	0.2	0.18	0.19	0.19	0.24	0.2	0.26	0.27	0.28	0.23	0.22	0.21	0.17	0.17	0.19	0.18	0.27	0.3	0.29	0.3
Arkansas	0.21	0.2	0.18	0.19	0.17	0.2	0.22	0.22	0.23	0.25	0.28	0.26	0.27	0.27	0.29	0.33	0.33	0.28	0.33	0.34	0.35
Idaho	0.23	0.14	0.12	0.14	0.14	0.15	0.15	0.16	0.15	0.15	0.16	0.15	0.14	0.17	0.17	0.16	0.18	0.19	0.23	0.23	0.23
Nevada	0.23	0.25	0.25	0.28	0.3	0.35	0.37	0.32	0.36	0.34	0.36	0.34	0.31	0.3	0.32	0.34	0.36	0.39	0.42	0.38	0.43
Puerto Rico	0.26	0.27	0.26	0.27	0.27	0.25	0.25	0.26	0.22	0.23	0.3	0.3	0.3	0.3	0.32	0.24	0.23	0.22	0.22	0.23	0.26
Alaska	0.29	0.29	0.29	0.29	0.3	0.33	0.34	0.29	0.35	0.32	0.28	0.22	0.2	0.21	0.23	0.28	0.31	0.33	0.32	0.3	0.33
Vermont	0.31	0.3	0.31	0.31	0.32	0.32	0.31	0.3	0.27	0.27	0.25	0.23	0.24	0.21	0.23	0.24	0.26	0.27	0.29	0.29	0.28
Kentucky	0.35	0.4	0.45	0.43	0.39	0.43	0.4	0.45	0.5	0.51	0.51	0.54	0.6	0.58	0.58	0.56	0.63	0.69	0.7	0.71	0.76
Mississippi	0.37	0.38	0.36	0.37	0.43	0.48	0.54	0.53	0.49	0.52	0.51	0.49	0.48	0.53	0.59	0.67	0.81	0.82	0.84	0.77	0.77
Nebraska	0.41	0.43	0.45	0.43	0.41	0.36	0.4	0.35	0.32	0.42	0.42	0.38	0.43	0.41	0.38	0.37	0.4	0.41	0.43	0.47	0.49
New Hampshire	0.44	0.45	0.47	0.48	0.47	0.46	0.52	0.54	0.57	0.53	0.45	0.46	0.47	0.47	0.48	0.54	0.6	0.63	0.67	0.69	0.69
Oklahoma	0.5	0.36	0.35	0.38	0.39	0.4	0.43	0.43	0.49	0.48	0.47	0.54	0.51	0.55	0.55	0.53	0.5	0.51	0.51	0.51	0.47
Kansas	0.51	0.53	0.51	0.52	0.49	0.45	0.43	0.48	0.5	0.51	0.53	0.5	0.53	0.53	0.55	0.6	0.6	0.61	0.64	0.62	0.62
South Carolina	0.51	0.49	0.48	0.5	0.48	0.49	0.55	0.57	0.65	0.75	0.86	0.9	0.76	0.75	0.69	0.75	0.88	0.84	0.91	0.89	0.82
Hawaii	0.58	0.53	0.47	0.47	0.45	0.44	0.44	0.43	0.35	0.31	0.33	0.48	0.51	0.57	0.58	0.54	0.51	0.55	0.6	0.69	0.68
Rhode Island	0.71	0.67	0.7	0.71	0.63	0.6	0.58	0.57	0.6	0.55	0.54	0.56	0.55	0.51	0.51	0.5	0.53	0.52	0.54	0.48	0.46
Louisiana	0.76	0.77	0.78	0.79	0.82	0.91	1.01	0.85	0.85	0.85	1.08	0.98	0.98	0.96	0.96	0.98	0.94	0.9	0.88	0.85	0.89
District of Columbia	0.88	0.86	0.9	0.9	0.98	0.94	0.89	0.89	0.88	0.86	1.03	1.09	1.1	1.09	1.08	1.06	1	0.89	0.89	0.87	0.83
Iowa	1.06	1.04	1.05	1.07	1.15	1.18	1.21	1.21	1.22	1.25	1.23	1.17	1.13	1.1	1.1	1.16	1.14	1.18	1.15	1.11	1.09
Alabama	1.07	1.13	1.26	1.38	1.4	1.42	1.34	1.34	1.4	1.47	1.49	1.61	1.83	1.86	1.63	1.57	1.63	1.67	1.66	1.51	1.53
Arizona	1.08	1.14	1.1	1.16	1.17	1.27	1.29	1.29	1.25	1.44	1.58	1.44	1.38	1.39	1.49	1.4	1.38	1.31	1.38	1.36	1.38
New Mexico	1.13	1.14	1.04	0.9	0.86	0.89	0.92	1	0.95	0.95	1.19	1.01	1.03	1.01	0.96	0.97	0.97	0.89	0.81	0.74	0.81
Oregon	1.13	1.1	1.12	1.11	1.11	1.12	1.07	1.13	1.14	1.16	1.19	1.27	1.37	1.42	1.43	1.41	1.33	1.25	1.28	1.34	1.35
Tennessee	1.16	1.18	1.19	1.36	1.43	1.47	1.47	1.52	1.52	1.57	1.45	1.43	1.4	1.37	1.35	1.37	1.4	1.45	1.55	1.58	1.62
Utah	1.16	1.17	1.11	1.19	1.21	1.31	1.34	1.28	1.14	1.07	1.05	1.06	1.1	1.09	1.1	1.1	1.11	1.07	1.07	1.04	0.95
New Jersey	1.27	1.25	1.32	1.31	1.33	1.41	1.47	1.49	1.4	1.52	1.56	1.56	1.57	1.51	1.49	1.47	1.43	1.45	1.5	1.52	1.59
Minnesota	1.46	1.51	1.5	1.48	1.49	1.51	1.63	1.51	1.48	1.45	1.48	1.46	1.42	1.37	1.31	1.33	1.39	1.37	1.2	1.13	1.12
Missouri	1.53	1.53	1.55	1.53	1.59	1.61	1.64	1.66	1.62	1.62	1.62	1.7	1.92	1.84	1.99	2.12	2.13	2.05	2.1	1.97	2.03
Indiana	1.6	1.6	1.52	1.6	1.51	1.4	1.41	1.39	1.41	1.44	1.49	1.47	1.47	1.41	1.39	1.3	1.29	1.26	1.32	1.32	1.3
Virginia	1.66	1.64	1.62	1.62	1.67	1.83	1.86	1.86	1.95	2.04	2	1.88	1.93	1.94	1.88	1.82	1.79	1.86	1.95	1.91	1.97
Florida	1.8	1.86	1.77	1.85	2.24	2.32	2.17	2.09	2.26	2.3	2.4	2.31	2.41	2.35	2.46	2.33	2.41	2.56	2.7	2.7	2.72
Colorado	1.85	1.87	1.85	1.86	1.86	1.88	1.85	1.89	1.89	1.92	2.01	1.98	2.06	2.19	2.25	2.44	2.28	2.22	2.16	2.25	2.21
Georgia	1.93	2.05	2.07	2.21	2.39	2.32	2.38	2.38	2.35	2.33	2.38	2.49	2.48	2.45	2.36	2.38	2.46	2.45	2.58	2.54	2.55
Connecticut	2.31	2.18	2.13	2.13	2.09	1.98	1.93	1.86	1.86	1.77	1.72	1.7	1.7	1.74	1.7	1.73	1.71	1.72	1.69	1.69	1.64
Wisconsin	2.37	2.38	2.36	2.34	2.24	2.21	2.17	2.19	2.17	2.15	2.06	2.04	2	1.98	1.94	1.99	2.01	2.03	2.04	2.04	2.09
Washington	2.6	2.43	2.28	2.23	2.3	2.41	2.5	2.69	2.64	2.61	2.58	2.64	2.59	2.58	2.6	2.53	2.54	2.53	2.6	2.56	2.37
North Carolina	2.66	2.72	2.72	2.88	3.01	2.98	3.08	3.12	3.32	3.42	3.42	3.38	3.26	3.41	3.43	3.37	3.41	3.4	3.39	3.38	3.47
Ohio	2.67	2.66	2.64	2.66	2.71	2.73	2.8	2.9	2.94	2.86	2.84	2.85	2.95	2.94	2.95	2.84	2.92	2.94	3	3.07	3.06
Michigan	2.89	2.82	2.83	2.97	2.94	2.87	3.03	3.06	3.18	3.19	3.18	3.09	3.19	3.14	3.16	3.16	3.23	3.2	3.2	2.97	3.02
Illinois	3.98	3.88	4.02	3.87	3.8	3.72	3.61	3.65	3.65	3.66	3.56	3.64	3.77	3.88	3.89	3.88	3.86	3.84	3.89	3.86	3.85
Pennsylvania	5.01	5.12	5.29	5.25	5.25	5.38	5.43	5.58	5.71	5.73	5.71	5.8	5.7	5.8	5.64	5.91	5.97	6.15	5.83	5.77	5.73
Texas	5.54	5.6	5.6	5.66	5.56	5.55	5.52	5.66	5.91	5.91	5.79	5.93	6.14	5.99	6.06	6.28	6.42	6.45	6.27	5.96	6.03
Maryland	7.33	7.46	7.89	7.58	7.92	7.62	7.78	7.54	7.17	7.16	6.88	6.73	6.61	6.69	6.57	6.22	6.25	6.48	6.1	6.19	6.06
Massachusetts	7.75	7.62	7.42	7.19	6.99	6.81	6.72	6.6	6.54	6.35	6.27	6.08	6.48	6.53	6.32	6.07	5.94	5.77	5.57	5.72	5.59
New York	10.67	10.77	10.62	10.29	9.76	9.63	9.24	9.13	9.09	8.86	8.54	8.26	8.2	8.08	8.3	8.42	8.14	8.12	8.11	8.08	8.24
California	14.68	14.74	14.74	14.8	14.47	14.48	14.23	14.15	13.89	13.66	13.74	14.31	13.35	13.38	13.55	13.47	13.16	12.86	12.87	13.7	13.61
Total	100	100.02	100.02	100.02	100	100.01	100.01	100	100.05	99.99	100.01	100	100	99.98	99.99	99.95	100	99.97	99.99	99.98	100

AK,VT,MS,NE ('85 Range=.29-.41)	0.345	0.35	0.3525	0.35	0.365	0.3725	0.3975	0.3675	0.3575	0.3825	0.365	0.33	0.3375	0.34	0.3575	0.39	0.445	0.4575	0.47	0.458	0.4675
KY ('85 =.35)	0.35	0.4	0.45	0.43	0.39	0.43	0.4	0.45	0.5	0.51	0.51	0.54	0.6	0.58	0.58	0.56	0.63	0.69	0.7	0.71	0.76
NH,OK,KS,SC,HI ('85 Range=.44-.58)	0.508	0.472	0.456	0.47	0.456	0.448	0.474	0.49	0.512	0.516	0.528	0.576	0.556	0.574	0.57	0.592	0.618	0.628	0.666	0.68	0.656
RI,LA,AL,NM ('85 Range=.71-1.13)	0.9175	0.9275	0.945	0.945	0.9275	0.955	0.9625	0.94	0.95	0.955	1.075	1.04	1.0975	1.085	1.015	1.005	1.0175	0.995	0.9725	0.895	0.9225